



Complete PV Power Plant
Certification
Technical Bankability



VDE, along with our partner Fraunhofer ISE are offering comprehensive quality assurance for solar photovoltaic (PV) power plant performance.

We provide PV plant certification services verifying system quality, validating performance and assuring safety.

VDE and Fraunhofer are uniquely positioned and capable:

- VDE, a globally recognized certification body in partnership with Fraunhofer ISE, a world class solar energy research institute with 20 years of experience in quality assurance of PV power plants
- Totally impartial, trusted, experienced and non-profit

The Goal: Risk Reduction through Certified Quality

Solar energy: excellent investment opportunities and a bright future ahead

Solar energy is growing, rapidly, and globally. Ongoing R&D coupled with economies of scale drives cost reduction and improved efficiency. Competitive price levels of PV systems have led to solar energy being less dependent on government support to provide attractive levels of investor returns. More than ever, the global PV market provides attractive new investment opportunities. However, the elements driving such rapid expansion also increase the risk of solar financial assets meeting long term fiscal and performance goals.

Quality as a main pillar for secure investment

PV is now a mainstream energy source. This new reality has created increasing challenges for all stakeholders. The manufacturing industry is consolidating. Rapidly dropping pricing and thin margins are facts

of life impacting the entire supply chain. These challenges have led to a redefinition of technical bankability by investors and lenders. Existing quality assurance measures, such as standard certification of individual components, are no longer sufficient to achieve technical bankability.

In order to achieve bankability and differentiation, a premium level of certification and quality assurance at the system level are required. Importantly, it is necessary to go beyond the standards with new and customized quality assurance products that address quality on a system-wide level. Such an approach leads to lower technical risk and increased trust and confidence for a PV system as a secure investment.





A Customized Approach to Technical Bankability

The VDE Institute and Fraunhofer Institute for Solar Energy Systems ISE have created a new quality assurance product tailored to the PV investment. Tailored customization allows PV systems to be individually tested according to the specific needs of investors and other stakeholders.

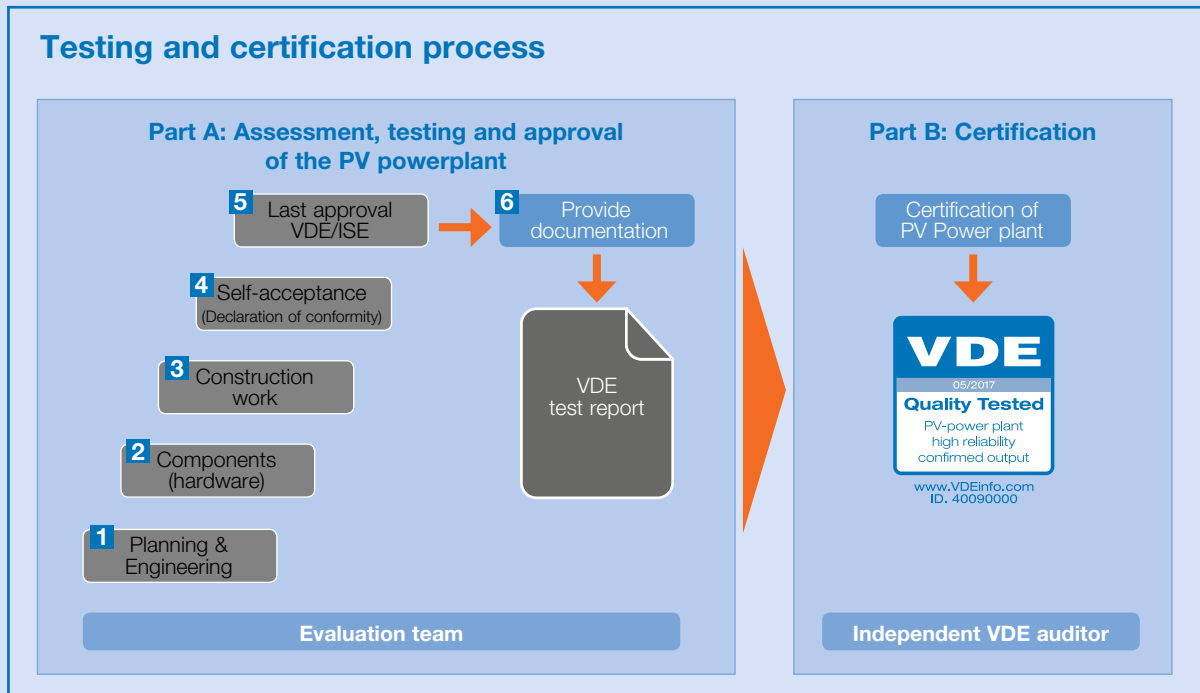
The VDE Quality Tested portfolio delivers significant advantages to all stakeholders in four key areas:

- Electrical and mechanical safety of the system
- System performance and energy yield verification
- Proper system operation
- Independent verification for investors, lenders, insurance companies and other stakeholders by highly competent and reputable experts

The base product portfolio is composed of comprehensive design review, sophisticated modeling and more than 300 testing points which must be passed in order to achieve the Quality Tested mark of certification. This highlights the stringent and comprehensive level of quality assurance provided by the product.

Furthermore, the VDE Quality Tested portfolio includes a 'toolbox' of additional services and test procedures for customization according to the individual needs of the customer. Additional test procedures will also be specifically mentioned on the awarded Quality Tested mark.





VDE / Fraunhofer ISE: Trusted, Independent, Capable

The more than 25 years of combined field and research experience between VDE and Fraunhofer ISE in testing and certification in the PV field have demonstrated the necessity for independent and complete PV system certification and achieving technical bankability.

Real world experience highlights the importance of system design, proper planning, engineering, component selection and construction work for successful PV systems. The VDE Quality Tested mark affirms that independent experts have validated every step from initial design through installed and operating power plants. All critical elements are checked not only against individual

international standards, which form the foundation of the VDE Quality Tested product portfolio, but also against new system level certifications developed internally. These new initiatives draw on the extensive experience of VDE and Fraunhofer ISE.

The VDE Quality Tested product was designed in such a way that the VDE auditor issuing the Quality Tested certification is independent of the evaluation team that conducted testing on the PV system. This creates further advantages for stakeholders by creating an extra layer of impartiality in the certification process.

VDE RENEWABLES GmbH
 Siemensstraße 30
 63755 Alzenau | Germany
 Tel: +49 69 6308-5300
 renewables@vde.com

www.vde.com/renewables



The VDE Quality Tested mark for Photovoltaic Power Plants

The VDE Quality Tested mark delivers key advantages for solar PV power plants in the crucial areas of ensuring quality, safety and performance:

- Verification of system design, proper planning and engineering
 - Evaluate the whole concept of the PV power plant for completeness
 - Validate existing reports such as the energy yield prediction and structural analysis
- Proofing of selected system components
 - Confirmation of component conformity to international standards
 - Checking of proper rating and dimensioning of all main components
- Checking of the detailed planning of each installation work package
 - Inspection of documentation of supervision of installation companies for the power plant's foundation, mounting system, PV modules, inverters, general electrical installation, lightning protection system and monitoring system
 - Verification of the qualifications of the selected installers
- Verification of documentation done during construction phase
 - Checking of the declaration of conformity and professional workmanship
 - Validation of system documentation
- Laboratory testing of module performance based on representative samples
 - Maximum power determination
 - Electroluminescence imaging
 - Determining module specific values such as temperature and irradiation dependency
- Extensive on-site inspection
 - Visual inspection of the installation and the complete system
 - Review of the safety and functionality of the PV power plant for compliance with current state-of-the-art procedures and standards, e.g. electrical safety, fire safety and stability
 - Testing of the PV generator on-site to determine the power output of the system based on representative samples; Taking of thermography images of the PV array with combiner boxes for identification of abnormalities
 - Calculation of the real energy yield and performance ratio, supported by values from laboratory testing measurements

The VDE Quality Tested mark for PV Power Plants honors components that possess VDE quality certification.